ACCELERATION SIMULATOR Docket #

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BACKGROUND OF THE INVENTION

Field of the Invention

The invention pertains to the field of acceleration affect and effect and applies to those areas which utilize this effect for creating a human sensation of such an affect and the use of the actual effect on masses to produce varying processes in manufacturing and entertainment, product evaluation simulation such as a flight simulator, automobile, fun ride, space craft, or space station. Numerous other uses will become known for the effects and affects which are described here.

Description of the Related Art

The Inventor is not aware of any relevant art. The other known uses of similar principals are in the simulator used at NASA and centrifuges used in various manufacturing process. Another possible Art may be in Thrill rides such as roller costars and merry-go-rounds.

Objectives and advantages of the invention:
Brief Description of the Drawing Figures

Figure 1 is an embodiment of the invention which includes a simulated scene inside a room.
Figure 2 is a side view of a simulator room.
Figure 3 is a coordinate system relative to the simulator room.
Figure 4 is a coordinate system rotated relative to the platform.

SUMMARY OF THE INVENTION

The current invention is a method of producing a virtual reality effect of changing acceleration direction and magnitude by rotating a subject relative to a center axis to produce a centrifugal force, rotating the subject relative to a second axis perpendicular to centrifugal force and rotating the subject relative to a third axis perpendicular to the axis perpendicular to centrifugal force, and changing the magnitude of the centrifugal force. As a consequence the subject will perceive the acceleration upon his center of mass as changing in magnitude and angle. It is further enhanced by projecting a simulated image on a screen which is rotating in the same frame of reference as the subject.

Elements and Functions

Table of Element and Numbers

#		Element Description
a		Angle made by Simulation Vector S an Z axis
A		Simulation Centrifugal Acceleration Vector
A	'	Second Simulation Centrifugal Acceleration Vector
d		Distance Between Simulator Room Center of Mass and Room Counter Mass Center of Mass
G		Gravitational Force Vector
r	1	Angle of Simulator Room Rotation
r	2	Angle of X Axis Rotation
S		Simulator Acceleration Vector
w	1	Angular Rotation Frequency of Platform
X		X axis of Simulation Seat

#		Element Description
Y		Y axis of Simulation Seat
Z		Z axis of Simulation Seat
10		Anchor Base
20		Motor
30		Motor Shaft
40		Rotating Base
50		Simulator 1st Angular Orientation Motor
60		Simulator Room Motor Shaft
70		Simulator Room
80		Simulator 2nd Angular Orientation Motor
90	a	Room Rotating Support Platform Arm
90	b	Room Rotating Support Platform Arm
95		Room Rotating Support Platform
100	a	Room Rotating Axis Arm
100	b	Room Rotating Axis Arm
110		Room Counter Balance Mass
120		Inputs to Computer
130		Outputs From Computer
140		Computer (micro-processor)
150		Counter Mass / Room Screw Adjust
160		Mass / Room Adjust Motor

#	Element Description
170	Acceleration Seat
180	Net Simulator Acceleration Vector
190	Video Screen
200	Video Screen
210	Simulator room vertical extender

Table of Functions, purposes, objectives, goals, advantages, tasks

Objective, goal, result or purpose	Solution, operation or function
Produce an acceleration on a mass within a room which will vary in direction.	Produce a reference frame relative to rotating frame which will rotate about 2 curvilinear coordinates
Produce an acceleration on a mass within a room which will vary in amplitude.	Change the angular frequency of rotating base 40 or the center of mass distance d from the center of the rotating base or the distance Change the angular frequency of the rotating frame or the distance from the center of the rotating reference frame.
Produce an acceleration on a mass which will vary in amplitude and direction. Relative to a reference object	Produce a reference frame relative to rotating frame which will rotate about 2 curvilinear coordinates

	40 or the center of mass distance d from the center of the rotating base or the distance Change the angular frequency of the rotating frame or the distance from the center of the rotating reference frame.
Produce an acceleration on a mass within a room which will vary in amplitude and direction relative to the room.	

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In Figure 1 an acceleration on a mass located in simulator room 70, such as a person setting in acceleration seat 140, is represented by net simulator acceleration vector 180, which varies in magnitude and varies in direction relative to simulator room 70. The variation in magnitude is produced as a consequence of the varying angular rotation w of the rotating base 40. The variation in direction r2 is produced by rotating simulator room support platform 90 relative to rotating base by causing simulator 1st angular orientation motor 50. The variation in direction r1 relative to simulator room 70 is produced by causing simulator 2nd angular orientation motor 80 to rotate simulator room 70 around room rotating axis arms 100a and 100b.

The variation in magnitude of the simulator vector can also be accomplished by varying the distance d which is distance that the simulator is from the center of rotation around platform motor 20 and the simulator room's center of mass 70. This is accomplished by room screw adjust drive 150.

In figure 2 an acceleration seat 170 is secured to simulator room 70. The simulation video screen 190 projects a simulated event which has an associated simulated acceleration vector **S** associated with it in time. The simulated event may be a prerecorded on video tape, an animated film or a computer program etc..

In figure 3 a reference frame **XYZ** is displayed which is rotating relative to some other reference frame. A simulated acceleration vector **S** is the composite of the gravitational vector **G** and the centrifugal force vector **A** i.e., **S=A+G** .

Figure 4 illustrates the resultant transformation **S** to **S'** if one angle of orientation is changed by angle r1, i.e., the x axis of **XYZ** is rotated an angle r1 about the z axis. The simulated acceleration vector appears to change directions in the frame **XYZ.** If a rotation is then produced by rotating an angle r2 around the Z axis of the XYZ frame then an orientation of any angle can be obtained.

Computer 140 interfaces to the motors and video screens through inputs 120 and outputs 130. A joy stick (not shown) could be interfaced to the computer through inputs 120 and an existing video game could be modified to produce an acceleration vector parameter to be used by the computer to control the simulation acceleration vector **S**. An acceleration sensor could be interfaced as an input device to provide feed back as to the actual acceleration produced on a mass within the simulator room.

While my above description contains many specificities, these should not be construed as limitations on the scope of the invention, but rather as an exemplification of one preferred embodiment thereof. Many other variations are possible. The scope of the invention should be determined not by the embodiment(s) illustrated, but by the appended claims and their legal equivalents.